

## LOW DIELECTRIC CONSTANT MATERIAL FOR INTEGRATED CIRCUIT FABRICATION

### Reference to Relation Applications

7p  
9/16/01  
[0001] This application is a divisional of U.S. application No. 09/146,397, filed September 3, 1998, <sup>now U.S. Patent 6,383,951</sup>

### Background of the Invention

#### Field of the Invention

[0002] The present invention relates in general to materials for use with integrated circuits and methods of making the same, and in particular to insulating materials having low dielectric constants for electrical isolation in high density integrated circuits..

#### Description of the Related Art

[0003] When fabricating integrated circuits (ICs), layers of insulating, conducting and semiconducting materials are deposited and patterned in sequence. The lowest levels or layers in the IC form electrical devices, such as transistors, separated by field isolation elements, with gate electrodes protected by insulating spacers. Memory cell capacitors are also associated with the lower layers for certain circuits. These electrical devices are generally interconnected by patterned wiring layers and interlevel contacts formed above the devices.

[0004] Conductive elements, like the transistor active areas and gates, capacitors, contacts and wiring layers, must each be electrically isolated from one another for proper circuit operation. The field isolation elements (e.g., field oxide) and gate spacers contribute to the isolation of transistor elements. Higher wiring layers include insulating material between the wiring layers, as well as between metal lines or runners within a wiring layer. Such insulating layers are often referred to as interlevel dielectrics (ILDs).

[0005] Continued miniaturization of ICs results in, among other things, shortened spacing between adjacent lines. Scaling the space between lines leads to increased parasitic capacitance, which delays signal transmissions. The delayed signal transmission thwarts the pursuit of higher operating speeds and lower power consumption, the very features which